

Incidence and Risk Factor of Cystobiliary Communication in Patients Undergoing Surgery for Hepatic Hydatid Cyst: A Single-Center Experience**Amarjit Kumar Raj¹, Rakesh Kumar Singh², Tushar Patel³, Malhar Bambholia⁴,
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Abstract:**Background/Aim:** To study the incidence and risk factors of cystobiliary communication (CBC) in patients undergoing surgery for hepatic hydatid disease (HD).**Methods:** All patients undergoing surgery for hepatic HD between March 2021 and December 2025 were included in the study. All patients were evaluated by history, clinical examination, routine blood investigations, and ultrasound (US) abdomen/CECT/MRCP. All patients were checked for CBC intraoperatively by the presence of bile in the cyst, presence of daughter cysts in the common bile duct, direct or indirect cholangiogram via the cystic duct, and postoperatively by the presence of bile in the drain.**Result:** Between March 2021 and November 2025, 67 patients with hepatic hydatid cysts were included in the study, with a female predominance (68.7%) and a mean age of 41.2 years. Cystobiliary communication (CBC) was identified in 31 patients, giving an incidence of 46.3% (95% CI: 34.3%–58.2%). There was no significant difference between CBC and non-CBC groups with respect to age or gender distribution. Most patients were symptomatic, with abdominal pain being the most common presenting complaint. Jaundice and clinical icterus were more frequently observed in the CBC group, and all patients with icterus had underlying CBC. Hepatomegaly was also more common among patients with CBC, although this difference was not statistically significant. Median liver enzyme levels (SGOT, SGPT, and ALP) were comparable between the two groups. On ultrasonography, cysts larger than 10 cm were significantly more common in the CBC group compared to the non-CBC group ($p = 0.012$). Notably, two-thirds of patients with cysts exceeding 10 cm had CBC. Contrast-enhanced CT demonstrated a trend toward larger cyst size in patients with CBC, though the difference did not reach statistical significance ($p = 0.072$). Centrally located cysts were more frequently associated with CBC, but without statistical significance.**Conclusion:** Cystobiliary communication was observed in nearly half of patients with hepatic hydatid disease and was more frequently associated with larger cysts and central cyst location. Clinical features such as jaundice and icterus were strongly suggestive of underlying CBC, although statistical significance could not be consistently demonstrated. Ultrasonography showed a significant association between cyst size greater than 10 cm and the presence of CBC, while CECT demonstrated a similar trend without statistical significance. These findings suggest that cyst size and selected clinical features may help predict CBC and guide preoperative evaluation and management.**Keywords:** Hydatid disease, Cystobiliary communication, Incidence, Risk factor, Biliary fistula.**DOI:** 10.25258/ijpqa.17.4.42

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Introduction

Hydatid disease (HD) or Echinococcosis, is a widespread zoonotic parasitic disease caused by a tapeworm that continues to be a clinical and public health problem worldwide. The most commonly affected organ is the liver (60%–70%), followed by the lungs (20%–30%) [1,2]. HD is most prevalent in the Middle East, the Baltic states, South America, India, northern China, and other regions where sheep are raised. However, because of increased global travel and tourism, it may now be found anywhere, even in wealthy nations [3]. HD is widespread throughout Indian states, with Andhra Pradesh and Tamil Nadu being the two most affected [4].

Four treatment options are currently available: antiparasitic medical treatment with benzimidazoles (BMZs), PAIR, conservative surgery, and radical surgery. Out of this surgery is the mainstay of treatment in most of the cases. Bile leak is the most common complication after hepatic hydatid surgery [5]. The main cause of bile leaks in postoperative patients is the existence of cystobiliary communications (CBC).

More than 1 million people are affected with echinococcosis at any one time worldwide [6]. CBC is reported in 5%–42% of hepatic HD cases [7]. There is very limited data on the incidence of CBC in the Indian population, especially from northern India.

CBC can be determined preoperatively, intraoperatively, and postoperatively [8]. If the diagnosis of CBC is made preoperatively or intraoperatively, postoperative morbidity and biliary fistula development occur at a lower rate [9–12]. The preoperative detection of CBC and a study of the size and location will allow the surgeon to plan the best possible treatment and will reduce the incidence of postoperative biliary fistula.

Delaying treatment of asymptomatic CBC can cause the onset of cholangitis or liver abscess [13,14]. In patients with CBC, postoperative mortality ranges from 1.25% to 7%, which is caused mainly by sepsis or liver failure [11,15,16]. Postoperative morbidity is between 16.7% and 55%, higher than observed in patients operated on for liver hydatid cysts without CBC [12,16–19]. The presence of communication between the cyst and biliary tree is directly associated with increased postoperative morbidity.

Due to the high incidence of morbidity and mortality associated with CBC, further study to know the actual incidence in our population is of paramount importance. In this context, we intend to assess the incidence and risk factors of CBC in hepatic HD patients in our population.

Material and Methods

The study was conducted among all patients undergoing surgery for hepatic hydatid cysts at tertiary care center in north India from March 2021 to Dec 2022. All patients were evaluated by history, general clinical examination, routine blood investigations, and US abdomen/Contrast-enhanced computed tomography (CECT) abdomen/ Magnetic resonance cholangiopancreatography (MRCP).

Cysts located in segments 1, 3, 4b, 5, and 6 were considered central, and cysts in segments 2, 4a, 7, and 8 were considered peripheral.

All patients with the diagnosis of hydatid cyst of the liver were checked for Cystobiliary communication intraoperatively by the following means:

1. Presence of bile in the cyst.
2. Presence of daughter cyst in the common bile duct.
3. Direct or indirect cholangiogram (by injecting air, water, or contrast) via the cystic duct.

And Postoperatively

1. By the presence of bile in the drain.

Statistical Analysis: Data were entered into Windows 10 Microsoft Excel sheets version 2016 and analyzed using STATA version 14. The prevalence of CBC is calculated. Categorical variables such as age, gender, pain, jaundice, fever, previous history of hydatid surgery, and hepatomegaly were compared between CBC and non-CBC groups using the chi-square test. The comparison of US size, number, location, and CECT characteristics was compared between the groups using the chi-square test. The comparison of SGOT, SGPT, total bilirubin, direct bilirubin, and ALP was compared between the CBC and non-CBC using an independent t-test or Mann-Whitney U test. A p-value less than 0.05 was considered statistically significant.

Result:

Between March 2021 and November 2025, 67 patients with hepatic hydatid cysts fulfilling the inclusion criteria were included in the study. Of these, 46 patients (68.7%) were female and 21 (31.3%) were male, with a female-to-male ratio of 2.2:1. The mean age of the study population was 41.2 years.

Out of the 67 patients, 31 patients had cystobiliary communication (CBC), giving an incidence of 46.3% with a 95% confidence interval of 34.3%–58.2%. The study flowchart is shown in Figure 1.

The mean age of patients in the CBC group was 43.3 years, and the female-to-male ratio was 2.1:1. There was no statistically significant difference between the CBC and non-CBC groups with respect to age and gender.

Out of the 67 patients, 62 patients (92.5%) were symptomatic, while 5 patients (7.5%) were diagnosed incidentally. Pain in the abdomen was the most common presenting complaint, reported in 59 patients (88.1%), followed by vomiting in 16 patients (23.9%), fever in 14 patients (20.9%), and jaundice in 6 patients (9.0%). One patient with concomitant pulmonary and hepatic hydatid disease presented with breathlessness.

Jaundice was present in 6 patients (9.0%), of whom 5 patients (16.1%) belonged to the CBC group and one patient (2.8%) to the non-CBC group. Icterus on clinical examination was noted in 5 patients (7.5%), and all of them had cystobiliary communication. These findings suggest a strong association between clinical jaundice, icterus, and the presence of CBC, although statistical significance could not be established, but it may be due to small sample size.

On physical examination, hepatomegaly was noted in 14 patients (20.9%). It was more frequently observed in the CBC group (29.0%) compared to the non-CBC group (13.9%); however, this difference did not reach statistical significance.

The median serum SGOT level was slightly higher in the CBC group compared to the non-CBC group (43 U/L vs 39 U/L), while the median SGPT level was marginally higher in the non-CBC group (42 U/L vs 37 U/L). Similarly, the median ALP value was higher among patients with CBC than those without CBC (124 U/L vs 108.5 U/L). However, none of these differences in liver enzyme levels reached statistical significance on Mann-Whitney U analysis (SGOT: $p = 0.559$; SGPT: $p = 0.739$; ALP: $p = 0.170$), suggesting comparable biochemical profiles between the two groups.

The US findings were compared between CBC and non-CBC groups. 16 patients (51.61%) in the CBC group compared to 8 patients (22.22%) in the non-CBC group had a cyst size of more than 10 cm. 66.67% of patients with cyst size more than 10 cm had CBC. Most of the patients in both groups had a single cyst. The most common location of the cyst was the right lobe i.e. 52 out of 67 patients had cysts in the right lobe. Patients with CBC had significantly higher rates of cysts >10 cm compared to non-CBC patients. This difference was statistically significant (Chi-square test, $p = 0.012$). Furthermore, 66.67% of patients with cysts larger than 10 cm belonged to the CBC group.

CECT findings between CBC and non-CBC groups were compared. 54.83% of patients in the CBC group and 27.77% of patients in the non-CBC group had cyst sizes of more than 10 cm, suggesting that patients in the CBC group had larger cyst size. The mean (SD) cyst size in the CBC group was 11.1 cm (4.3) and in the non-CBC group was 8.4 cm (2.6). Although a trend toward larger cyst size was observed in patients with CBC, the difference in CECT

size distribution between CBC and non-CBC groups did not achieve statistical significance ($\chi^2 = 5.25$, $df = 2$; $p = 0.072$).

The Two groups were compared as per the location of the cysts in CECT. 16 patients (51.61%) in the CBC group had cysts located centrally compared to 11 patients (30.55) in the non-CBC group, this suggests that CBC is more common in cysts located centrally, though statistical significance was not found.

Abbreviations:

ALP: Alkaline phosphatase

CBC: Cystobiliary communications

CECT: Contrast-enhanced computed tomography

ERCP: Endoscopic retrograde cholangiopancreatography

HD: Hydatid disease

IHBRD: Intrahepatic biliary radical dilatation

LFT: Liver function test

MRCP: Magnetic resonance cholangiography

PAIR: Percutaneous aspiration injection reaspiration

SD: Standard deviation

SGOT: Serum glutamic oxaloacetic transaminase,

SGPT: Serum glutamic pyruvate transaminase

US: Ultrasound

Discussion

The incidence of CBC in our study is 46.3% with a 95% confidence interval of 34.3%–58.2%. A study by Deo et al [20], from north India, published in 2020, included 64 patients with hepatic hydatid cysts, the mean age of the patients was 35.64 years, and around 60% of patients were female. Cystobiliary communication was identified in 26 patients (40.6%). Another study by Manterola et al [21], published in 2010 included 252 patients with liver hydatidosis, the mean age of the patients was 42 years, and 56.4% of patients were female. The incidence of CBC was 61.9% in the study.

A similar study was done by Malik et al [22] in 2010 among 69 patients with hepatic hydatid cysts, the median age of the patients was 35 years, and 42 (60.9%) patients were female. Six (9%) patients had cystobiliary communication. In a retrospective study of 672 patients with hepatic hydatid cysts by El Malki et al [8] in 2010, 159 (24.5%) patients had cystobiliary communication. 83 (52%) participants were female and the mean age of the participants was 36.31 years.

In the study by Deo et al [20], similar to our study most common presentation was pain $n=56$ (87.5%), followed by fever $n=18$ (28.1%) and jaundice $n=7$ (10.9%). Similar findings were also noted in the study by Mallik et al [22], in this study $n=6$ (9%) patients presented with jaundice and all were having CBC.

In our study, we assessed the correlation of different variables like LFT parameters, size, number, and location of the cyst with the CBC. The findings are similar to the study done by Demircan et al [23], in which the mean SGOT and SGPT in the CBC group were higher compared to the non-CBC group (60 and 57 vs 28 and 26). A similar observation was found for total and direct bilirubin values. In our study, the difference between the groups was not statistically significant might be because of the small sample size in each group.

El Malki et al [8] Linked (univariate analysis) that a fibrotic or calcified pericystic wall, preoperative jaundice, cyst Gharbi type IV, and recurrent cysts were predictors of communication between the cyst and the biliary tree. Other predictors described are high preoperative ALP, gamma-glutamyl transferase (GGT), and bilirubin or the presence of nausea and vomiting [11,24].

Manterola et al [21] Compared two cohorts with the presence or absence of CBC, the bivariate analysis highlights the differences between the group concerning total leukocyte count, bilirubin, alkaline phosphatase, transaminase, and cyst diameter.

A nomogram analysis to predict the risk of CBC in patients undergoing surgery for liver hydatid surgery by Zhan wang et al [25] published in 2020, included cyst diameter, ALP, GGT, and whether cysts were located in the hilum of the liver as a variable in the scoring system and found that higher the score, greater the risk of CBC.

CECT findings between CBC and non-CBC groups were compared. The mean (SD) cyst size in the CBC group was 11.1 cm and in the non-CBC group was 8.4 cm, this difference between the two groups is statistically not significant. This finding correlates with many other studies by El Malki et al [8], Manterola et al [21], Wang et al [26], Demircan et al [24], and Akkapulu et al [26].

Limitation of the study

This is a single-center study with a small sample size so the significance among different variables couldn't be achieved.

Another limitation is that we excluded patients who are managed conservatively but we aimed to see the incidence of CBC in patients undergoing surgery for hydatid cysts

Conclusion

Cystobiliary communication was observed in nearly half of patients with hepatic hydatid disease and was more frequently associated with larger cysts and central cyst location. Clinical features such as jaundice and icterus were strongly suggestive of underlying CBC, although statistical significance could not be consistently demonstrated. Ultrasonography showed a significant association between cyst size greater than 10 cm and the presence of CBC, while CECT demonstrated a similar trend without statistical significance. These findings suggest that cyst size and selected clinical features may help predict CBC and guide preoperative evaluation and management.

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